additional claims are supported by the Specification, no new matter is added, and entry of the amendments and the added claims is respectfully requested.

II. REJECTION UNDER § 102(b) OVER *CHIU*

The Examiner rejected claims 1 to 5 and 8 under § 102(b) as being anticipated by *Chiu* (U.S. Patent No. 4,735,633).

As amended claim 1, and the claims which are dependent therefrom, are to a gas treatment apparatus for reducing a hazardous gas content of an effluent from a process chamber. The gas treatment apparatus comprises an exhaust tube through which effluent from the process chamber may be flowed and a microwave energy applicator to couple microwaves to the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent.

Chiu is to a plasma extraction reactor for removing "vapor phase waste species" from effluent. *Chiu* teaches a pair of electrodes to which an RF voltage is applied to induce a glow discharge in the effluent and to cause excited species in the vapor to react at the electrode surface to deposit a stable film thereon. The charged electrodes are configured as concentric spirals or rings to direct the effluent from an outer periphery to an inner core. (Col. 3, lines 49 to 52.) An alternate embodiment shown in Figures 3 and 4 shows a plurality of electrodes in a stacked arrangement. All these versions provide a convoluted and circuitous flow path of effluent through the reactor.

To anticipate a claim, a reference must show each and every element of the claim and must enable one skilled in the art to make the anticipated subject matter. *Chiu* does not teach a microwave energy applicator adapted to energize the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent,

as recited in amended claim 1. Nor does *Chiu* teach or suggest the desirability of using a microwave energy applicator. Microwave-activated gas has dissociated gas species that react with each other to generate non-hazardous species or compounds in the effluent. Neither of these features is taught or suggested by *Chiu*. Moreover, *Chiu* teaches that electrodes are necessary to provide a surface at which vapors in effluent can react and on which products of the reaction are deposited. The electrodes within the reactor of *Chiu* would absorb or impede the propagation of microwaves. Thus, by teaching use of electrodes, *Chiu* teaches against use of a microwave energy applicator. Accordingly, it is respectfully requested that the rejection of claim 1, and of the claims which are dependent therefrom, be withdrawn.

In addition, claim 2 is further allowable because it is to a gas treatment apparatus wherein the exhaust tube comprises a length that is sufficiently long to reduce the hazardous gas content of a continuous stream of effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube. *Chiu* teaches two different reactor designs both of which circulate the effluent in a convoluted and circuitous flow path. *Chiu* does not teach or suggest the advantages of reducing the hazardous gas content in a continuous stream of effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube. In contrast, *Chiu* teaches a convoluted flow path in which the effluent is circulated between concentric or stacked electrodes to maximize the surface area of the electrodes in contact with the effluent. Moreover, *Chiu* teaches that deposition of byproducts on the electrode surfaces is necessary for the operation of the invention. Thus, *Chiu* does not teach or suggest an exhaust tube having a length that is sufficiently long to reduce the hazardous gas content of a continuous stream of effluent flowing through the exhaust tube without recirculating the effluent in the exhaust tube. Accordingly, it is respectfully requested that the rejection of claim 2 also be withdrawn.

III. REJECTION UNDER § 102(b) OVER *FUJITSU*

The Examiner also rejected claim 6 under § 102(b) as anticipated by *Fujitsu Ltd.* (Japanese Patent Application No. JP 51-129868). During a telephone conversation with the Examiner on March 23, 1999, it was determined that *Fujitsu* and *Itoga et al.* are one and the same. Hence, throughout this response the *Fujitsu* reference will be referred to as *Itoga et al.*

Claim 6, as amended, is to a gas treatment apparatus according to claim 1 further comprising a reagent gas mixer adapted to mix reagent gas with the effluent to further reduce the hazardous gas content of the effluent.

Itoga et al. (Fujitsu) is to a method of treating a waste gas to transform toxic substances into stabilized compounds which are then removed from the waste gas. *Itoga et al.* teach that the waste gas containing toxic substances and oxidizing agents are "brought into contact with each other in a space wherein plasma is generated." The plasma is generated by applying high frequency power to a coil surrounding a cylindrical chamber.

Itoga et al. do not teach or suggest a microwave energy applicator adapted to energize the effluent flowing through an exhaust tube, nor does *Itoga et al.* teach or suggest the advantages of using a microwave energy applicator as described above. Thus, *Itoga et al.* does not anticipate claim 6.

IV. REJECTION UNDER § 103(a) OVER *ARAI*

The Examiner rejected claim 7 under § 103(a) over *Arai* (U.S. Patent No. 4,207,452).

Claim 7, as amended, is to a gas treatment apparatus according to claim 1 wherein the exhaust tube comprises monocrystalline sapphire.

Arai is to an activated gas generator which comprises a dielectric tube formed in a gas pipe which extends through a microwave irradiation furnace. *Arai* teaches surrounding the gas pipe outside and adjacent to the dielectric tube with a water bath to cool the dielectric tube and to absorb microwaves leaking along the outside of the dielectric tube. *Arai* teaches that the dielectric tube is made from a "highly heat-resistant material such as quartz." (Col. 3, lines 33 and 34.)

While acknowledging that *Arai* is not directed to an apparatus for reducing hazardous gas content, the Examiner states that "replicating the gas energizer on chamber input," taught by *Arai*, "*is one of only two choices to reduce emissions*, the other being recycling." The Examiner goes on to state that the motivation for making such a modification comes from 40 C.F.R. Part 82, The Clean Air Act, which lists the halocarbons subject to regulation. The Examiner also states that although *Arai* does not teach selecting monocrystalline sapphire for the dielectric tube "a person of ordinary skill . . . would be motivated to select a material, such as a ceramic represented as a monocrystalline sapphire, for the exhaust tube that would optimally service its function, namely as a conduit for heated gas existing in a corrosive plasma environment in addition to transmission of microwave energy."

Obviousness cannot be established without some suggestion or incentive in the prior art that suggests the desirability of the claimed invention. Something in the prior art must provide a motivation whereby one of ordinary skill would be led to do that which the Applicants have done.

Applicants respectfully disagree with the rejection and request reconsideration. Applicants submit that replicating the gas energizer taught by *Arai* on

the chamber output is not one of only two choices to reduce emissions. There are numerous other abatement devices and methods which are widely known, *e.g.* scrubbers and burn boxes; thus one skilled in the art would have more than two choices. Moreover, both the suggestion and the reasonable expectation of success must be found in the prior art and not in Applicants' disclosure. The cited art gives no indication that it is desirable to place a microwave energy applicator on the output of a chamber to reduce the hazardous gas content of effluent from the chamber. Nor is there any teaching or suggestion in *Arai* to abate the hazardous gas by activating the gas with microwaves. Furthermore, while the provisions of The Clean Air Act may provide motivation to reduce emissions, they do not provide teachings or the motivation to derive the claimed invention, namely, a gas treatment apparatus having a microwave energy applicator to couple microwaves to the exhaust tube to energize the effluent. Thus, claim 7 is not obvious over *Arai*.

The Applicants also submit that one of ordinary skill would not be motivated by *Arai* to select monocrystalline sapphire for the exhaust tube. *Arai* does not teach or suggest advantages of reduced erosion due to fewer inter-grain boundaries in mononcrystalline sapphire. *Arai* teaches that the gas activating section of the gas pipe is made of a highly heat resistant dielectric material. *Arai* gives only one example of a suitable material, quartz, and there are many possible choices of materials. Therefore, it is not obvious to select monocrystalline sapphire for the exhaust tube. Accordingly, it is respectfully requested that the rejection of claim 7 be withdrawn.

V. REJECTION UNDER § 103(a) OVER *CHIU* IN VIEW OF *ITOGA ET AL.* AND *OTSUBO*

The Examiner also rejected claims 10 and 27 to 30 under § 103(a) over *Chiu* in view of *Itoga et al.* and *Otsubo et al.* (U.S. Patent No. 4,479,848).

Chiu is to a plasma extraction reactor for removing "vapor phase waste species" from effluent using a pair of electrodes to which an RF voltage is applied to induce a glow discharge in the effluent, and to cause excited species in the vapor to react at the electrode surface to deposit a film thereon.

Claim 1 (from which claim 10 depends) is not obvious over *Chiu* because *Chiu* does not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. *Chiu* does not suggest the desirability of using a microwave energy applicator to generate dissociated gas species that chemically react in a different manner than in an RF plasma. Furthermore, as explained above, *Chiu* implicitly teaches away from using microwaves by teaching that charged electrodes are required and that they provide a surface at which the effluent reacts. In addition, *Chiu* does not teach or suggest a computer controller system which controls operating conditions of the process chamber in response to a signal from a gas analyzer as claimed in claim 10. Moreover, *Chiu* does not teach or suggest a computer controller system comprising program code as described in claims 10, 27, and 28. Thus, claims 10 and 27 to 30 are not obvious over *Chiu*.

Claim 1 (from which claim 10 depends) is not obvious over *Itoga et al.* because *Itoga et al.* do not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. Moreover, claims 10 and 27 to 30 are not obvious over because *Itoga et al.* do not teach or suggest a gas analyzer adapted to monitor the hazardous gas content of the effluent. Neither do *Itoga et al.* teach nor suggest a computer controller system which controls operating conditions of the process chamber or the gas treatment apparatus in response to a signal from the gas analyzer. *Itoga et al.* also do not teach or suggest a computer controller system and program code as described in claims 10, 27, and 28. Thus, claims 10 and 27 to 30 are not obvious over *Itoga et al.*.

Otsubo et al. teach an etching method and apparatus wherein an optical image is reflected from a pattern on a substrate during etching, changes in contrast of the image are monitored, and an endpoint for the etch is determined. The Examiner acknowledges that *Otsubo et al.* do not teach microwave activation of a gas, nor is the reference directed to an apparatus for reducing hazardous gas content in chamber effluent. However, the Examiner states that "the process control algorithm set forth by Otsubo et al. represents a template of knowledge from which Chiu's effluent residual gas analyzer can obviously be modified by, for example, coupling the signal from Chiu's RGA to the control and decision circuitry taught by Otsubo et al."

Claim 10 is not obvious over *Otsubo et al.* because *Otsubo et al.* do not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. In fact, as acknowledged by the Examiner, *Otsubo et al.* are not directed to an apparatus or method of treating effluent from the process chamber. Moreover, claims 10, 27 and 28 are not obvious over *Otsubo et al.* because *Otsubo et al.* do not teach or suggest a gas analyzer adapted to monitor the hazardous gas content of the effluent as claimed in claims 10, 26 (from which 27 depends), and 28. Furthermore, claims 10 and 27 to 30 are not obvious over *Otsubo et al.* because *Otsubo et al.* do not teach or suggest a computer controller system which controls operating conditions of a process chamber and a gas treatment apparatus in response to a signal from the gas analyzer. Thus, claims 10 and 27 to 30 are not obvious over *Otsubo et al.*

Claims 10 and 27 to 30 are also not obvious over the combination of *Chiu*, *Itoga et al.*, and *Otsubo et al.* Obviousness cannot be established without some suggestion or incentive in the prior art that suggests the desirability of the claimed invention. There are no teachings or suggestions in *Chiu*, *Itoga et al.*, and *Otsubo et al.* to combine or modify the references to derive the claimed invention. None of the cited references teach or suggest the advantages of a computer controller system

which controls operating conditions of the chamber or gas treatment apparatus in response to a signal from a gas analyzer. The computer controller system can improve efficiency of the gas treatment apparatus by operating the gas energizer at the lowest power level consistent with reducing hazardous gas in the effluent to an acceptable level. The computer controller system can also prevent damage to the substrate being processed by performing a controlled shutdown, if necessary, rather than just stopping the flow process gas or cutting off power to the gas energizer in the chamber. An uncontrolled shutdown could result in damage to the substrate due to non-uniform processing, or uncertainty as to process time remaining. Moreover, neither *Chiu*, *Itoga et al.* nor *Otsubo et al.* teach or suggest which of several operating parameters of the process chamber or the gas treatment apparatus can or should be altered when the hazardous gas content of the effluent exceeds a safety level. Accordingly, it is respectfully requested that the rejection of claims 10 and 27 to 30 be withdrawn.

VI. REJECTION UNDER § 103(a) OVER *ARAI* IN VIEW OF *CHIU, ITOGA ET AL.,* AND *RANSCH*

The Examiner also rejected claims 11 to 14 and 25 under § 103(a) over *Arai* in view of *Chiu*, *Itoga et al.*, *Ransch* (German Patent No. DD-215706), and *Itoga et al.* (Japanese Patent Application No. JP 51-129868).

Claim 13 has been canceled by this amendment thus obviating this rejection.

As amended claim 11, and claims 12 and14 which depend therefrom, are to a process chamber for processing a substrate and reducing emissions of hazardous gas to the environment. The process chamber comprises a support capable of supporting the substrate in the process chamber, a gas distributor capable of introducing process gas into the process chamber, and a gas activator capable of

activating the process gas to process the substrate, thereby forming an effluent containing hazardous gas. An exhaust tube through which a continuous stream of the effluent may be flowed and a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent.

Claim 25 is dependent on claim 24. As amended, claim 24 is to a process chamber for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment. The process chamber comprises a support capable of supporting the substrate, a gas distributor capable of introducing process gas into the process chamber, and a gas activator capable of activating the process gas to process the substrate, thereby forming effluent containing hazardous gas. The process chamber further comprises an exhaust tube comprising monocrystalline sapphire through which effluent from the process chamber may be flowed and a microwave energy applicator to couple microwaves to the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent.

Applicants respectfully submit that claims 11 and 24 (from which claim 25 depends) are not obvious over *Arai*. There is no teaching or suggestion in *Arai* that is desirable to install the gas energizer of *Arai* on the output of the chamber or to modify the gas energizer and to operate it to reduce the hazardous gas content of the effluent. In fact, there is no teaching or suggestion in *Arai* that it is desirable to abate the hazardous gas by dissociation of the gas using microwaves. Thus, claims 11, 12, 14, and 25 are not obvious over *Arai*.

Claim 11 and claim 24 (from which claim 25 depends) are not obvious over *Chiu* because *Chiu* does not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. *Chiu* does not suggest the desirability of using a microwave energy applicator to provide dissociated gas species for abatement of hazardous gas in the effluent. Furthermore,

as explained above, *Chiu* implicitly teaches away from using microwaves by teaching charged electrodes that provide a surface at which the effluent reacts. Thus, claims 11, 12, 14, and 25 are not obvious over *Chiu*.

Claim 11 and claim 24 (from which claim 25 depends) are not obvious over *Itoga et al.* because *Itoga et al.* do not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. *Itoga et al.* do not teach or suggest the advantages of using microwaves to provide dissociated gas species in the effluent. Thus, claims 11, 12, 14, and 25 are not obvious over *Itoga et al.*.

Ransch is to an apparatus and method of cleaning waste gases from a process chamber by passing the waste gas over a plate of a reactant material, such as Fe, Al, or Cu, in a container in the presence of an inert gas. A plasma is maintained in the container by capacitively coupling between the container and the reactant material. The plasma serves to heat the reactant material and to continually renew the surfaces of the reactant material in contact with the waste gas.

Claims 11, 12, 14,and 25 are not obvious over *Ransch* because *Ransch* does not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. Moreover, *Ransch* does not abate the hazardous gases by dissociation using microwaves. Instead *Ransch* uses a plasma to heat the reactant material and to continually renew its contact surfaces. Thus, claims 11, 12, 14, and 25 are not obvious over *Ransch*.

Claims 11, 12, 14, and 25 are also not obvious over the combination of *Arai*, *Chiu*, *Itoga et al.*, and *Ransch*. There is no teaching or suggestion by *Arai, Chiu, Itoga et al.* and *Ransch* to combine or modify the references. *Arai* is not directed to reducing hazardous gas in effluent. *Chiu* and *Ransch* are to reducing hazardous gas by

different plasma mechanisms. *Itoga et al.* is to another different gas energizer that uses a high frequency coil and fails to teach or suggest the advantages of microwave-based abatement. None of the cited references teach or suggest the advantages of reducing the hazardous gas content of an effluent using a microwave energy applicator. Accordingly, it is respectfully requested that the rejection of claims 11, 12, 14, and 25 be withdrawn.

VII. REJECTION UNDER § 103(a) OVER *CHIU*

The Examiner also rejected claims 9 and 15 under § 103(a) over *Chiu*.

Claim 9 is to a gas treatment apparatus according to claim 1 further comprising a distributor plate at an inlet of the exhaust tube. The distributor plate has holes adapted to direct effluent preferentially along a flow surface of the exhaust tube.

Claim 15 is to a process chamber according to claim 11 wherein the exhaust tube comprises monocrystalline sapphire.

As explained above, claim 1 (from which claim 9 depends) and claim 11 (from which claim 15 depends) are not obvious over *Chiu* because *Chiu* does not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. In fact, by teaching that charged electrodes are necessary to provide a surface at which vapors in effluent can react and on which products of the reaction are deposited, *Chiu* implicitly teaches against a microwave energy applicator. Moreover, claim 15 is not obvious over *Chiu* because *Chiu* does not teach or suggest the advantages of an exhaust tube comprising monocrystalline sapphire, namely reduced erosion due to fewer inter-grain boundaries. Thus, claims 9 and 15 are not obvious over *Chiu*. Accordingly, it is respectfully requested that the rejection of claims 9 and 15 be withdrawn.

VIII. REJECTION UNDER § 103(a) OVER *ARAI* IN VIEW OF *ITOGA ET AL.* AND *RANSCH*

The Examiner further rejected claims 13 under § 103(a) over *Arai* in view of *Itoga et al.*, and *Ransch*.

Claim 13 has been canceled been canceled by this amendment thus obviating this rejection.

IX. REJECTION UNDER § 103(a) OVER *CHIU* IN VIEW OF *OTSUBO*

The Examiner also rejected claims 16 under § 103(a) over *Chiu* in view of *Otsuba et al.* The Examiner acknowledges that *Otsubo et al.* do not teach microwave activation of a gas, nor is it directed to an apparatus for reducing hazardous gas content in a chamber effluent. However, the Examiner states that "the process control algorithm set forth by *Otsubo et al.* represents a template of knowledge from which *Chiu's* effluent residual gas analyzer can obviously be modified by, for example, coupling the signal from *Chiu's* RGA to the control and decision circuitry taught by *Otsubo et al.*"

Claim 11, on which claim 16 depends, is not obvious over *Chiu* because *Chiu* does not teach a microwave energy applicator adapted to energize the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent. In fact, by teaching that charged electrodes are necessary to provide a surface at which vapors in effluent can react and on which products of the reaction are deposited, *Chiu* teaches against a microwave energy applicator. Moreover, *Chiu* does not teach or suggest a computer controller system which controls operating conditions of a process chamber or the gas treatment apparatus in response to a signal from a gas analyzer. Thus, claim 16 is not obvious over *Chiu*.

Furthermore, claim 16 is not obvious over *Otsubo et al.* because *Otsubo et al.* do not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. In fact, *Otsubo et al.* is not directed to an apparatus or method of treating effluent from a process chamber at all, but rather is to an etching method and apparatus having an optical endpoint detector. *Otsubo et al.* do not teach or suggest a gas analyzer adapted to monitor the hazardous gas content of the effluent, nor do they teach or suggest a computer controller system which controls operating conditions of the process chamber or the gas treatment apparatus in response to a signal from the gas analyzer. Thus, claim 16 is not obvious over *Otsubo et al.*

Claim 16 is also not obvious over the combination of *Chiu* and *Otsubo et al.* There is no teaching or suggestion by *Chiu* or by *Otsubo et al.* to combine or modify the references, nor do the cited references teach or suggest the advantages of a computer controller system which controls operating conditions of the process chamber or a gas treatment apparatus in response to a signal from a gas analyzer. The computer controller system can improve efficiency of the gas treatment apparatus by operating the microwave energy applicator at the lowest power level consistent with reducing hazardous gas in the effluent to an acceptable level. The computer controller system can also prevent damage to the substrate being processed by performing a controlled shutdown, if necessary, rather than just stopping the flow of process gas or cutting off power to the gas activator in the process chamber. Furthermore, *Otsubo et al.* gives no indication of which of several parameters of the process chamber or the gas treatment apparatus can or should be altered when the hazardous gas content of the effluent exceeds a safety level. Accordingly, it is respectfully requested that the rejection of claim 16 be withdrawn.

X. REJECTION UNDER § 103(a) OVER *ARAI* IN VIEW OF *CHIU, ITOGA ET AL.,* AND *RANSCH*

The Examiner also rejected claim 24 under § 103(a) over *Arai* in view of *Chiu, Itoga et al.*, and *Ransch*.

As amended, claim 24 is to a process chamber for processing a substrate in a process gas and reducing emissions of hazardous gas to the environment. The process chamber comprises a support capable of supporting the substrate, a gas distributor capable of introducing process gas into the process chamber, and a gas activator capable of activating the process gas to process the substrate, thereby forming effluent containing hazardous gas. The process chamber further comprises an exhaust tube comprising monocrystalline sapphire through which effluent from the process chamber may be flowed. A microwave energy applicator is adapted to couple microwaves to the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent.

Applicants respectfully submit that claim 24 is not obvious over *Arai*. *Arai* gives no indication that it is desirable to have a microwave energy applicator on the output of the chamber to reduce the hazardous gas content of the effluent. Nor is there any teaching or suggestion in *Arai* to abate the hazardous gas by dissociation using microwaves.

Furthermore, Applicants also submit that one of ordinary skill would not be motivated by *Arai* to select an exhaust tube comprising monocrystalline sapphire. *Arai* does not teach or suggest advantages of reduced erosion due to fewer inter-grain boundaries in mononcrystalline sapphire. *Arai* gives only one example of a highly heat resistant dielectric material, quartz, for use in the gas pipe, and gives no suggestion as

to which of many other possible choices may also be successful. Thus, claim 24 is not obvious over *Arai*.

Claim 24 is not obvious over *Chiu* because *Chiu* does not teach or suggest a microwave energy applicator adapted to energize the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent. Moreover, *Chiu* teaches that charged electrodes are needed to provide a surface at which vapors in effluent can react and on which products of the reaction are deposited. By teaching the use of charged electrodes, *Chiu* teaches against use of microwaves. Furthermore, *Chiu* does not teach or suggest an exhaust tube comprising monocrystalline sapphire. Thus, claim 24 is not obvious over *Chiu*.

Claim 24 is not obvious over *Itoga et al.* because *Itoga et al.* do not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. *Itoga et al.* also does not teach or suggest an exhaust tube comprising monocrystalline sapphire. Thus, claim 24 is not obvious over *Itoga et al.*.

Claim 24 is not obvious over *Ransch* because *Ransch* does not teach or suggest a microwave energy applicator to couple microwaves to the effluent in the exhaust tube to energize the effluent. Moreover, *Ransch* does not abate the hazardous gases by dissociation using microwaves. Instead *Ransch* uses the plasma to heat the reactant material is and to continually renew its contact surfaces. Thus, claim 24 is not obvious over *Ransch*.

Moreover, claim 24 is not obvious over the combination of *Arai, Chiu, Itoga et al.*, and *Ransch* because there is no teaching or suggestion in *Arai, Chiu, Itoga et al.*, and *Ransch* to combine or modify the references to achieve Applicants' invention. *Arai* teaches a microwave gas energizer, but is not directed to reducing

hazardous gas in effluent by microwaves. *Chiu* and *Ransch* are directed to reducing hazardous gas but by a different plasma, and neither teach or suggest a microwave energy applicator adapted to energize the effluent flowing through the exhaust tube to reduce the hazardous gas content of the effluent. *Itoga et al.* teach a completely different gas energizer using a high frequency coil and fail to teach or suggest the advantages of microwave abatement. Moreover, none of the cited references teach or suggest the advantages of an exhaust tube comprising monocrystalline sapphire. Accordingly, it is respectfully requested that the rejection of claim 24 be withdrawn.

XI. REJECTION UNDER § 103(a) OVER *ARAI* IN VIEW OF *OTSUBO*

The Examiner also rejected claims 26 under § 103(a) over *Arai* in view of *Otsuba et al.*

Claim 26 is not obvious over *Arai* because *Arai* is not directed to reducing the hazardous gas content of an effluent from the process chamber. *Arai* does not teach or suggest that it is desirable to have a microwave energy applicator to reduce the hazardous gas content of effluent from a chamber. In fact, there is no teaching or suggestion in *Arai* that hazardous gas in the effluent can be reduced by microwaves or that it is desirable to do so. Thus, claim 26 is not obvious over *Arai*.

Claim 26 is also not obvious over *Otsubo et al.* because *Otsubo et al.* is not directed to an apparatus or method of treating effluent from the process chamber. *Otsubo et al.* do not teach or suggest a gas analyzer adapted to monitor the hazardous gas content of the effluent as claimed in claim 26. Neither do *Otsubo et al.* teach or suggest a gas analyzer and a computer controller system which controls operating conditions of the process chamber or the exhaust in response to a signal from the gas analyzer to reduce the hazardous gas content of the effluent. Thus, claim 26 is not obvious over *Otsubo et al.*

Claim 26 is also not obvious over the combination of *Arai* and *Otsubo et al.* There is no teaching or suggestion by *Arai* or *Otsubo et al.* to combine or modify the references to derive the claimed invention. In fact, neither of the cited references is directed to reducing hazardous gas in effluent. *Otsubo et al.* is to monitoring an etch endpoint in a chamber in which the plasma generator comprises two opposing electrodes. *Arai* does not teach reducing hazardous gas in effluent. Moreover, *Arai* or *Otsubo et al.* do not teach or suggest the advantages of a computer controller system which controls operating conditions of the process chamber or the exhaust system in response to a signal from a gas analyzer. Accordingly, it is respectfully requested that the rejection of claim 26 be withdrawn.

The above-discussed amendments and remarks are believed to place the present application in condition for allowance, and an early Notice of Allowance is respectfully requested. Should the Examiner have any questions regarding the above amendments, the Examiner is respectfully requested to telephone Applicants' representative at the number listed below.

Respectfully submitted,

JANAH & ASSOCIATES
A PROFESSIONAL CORPORATION

Date: April 26, 1999

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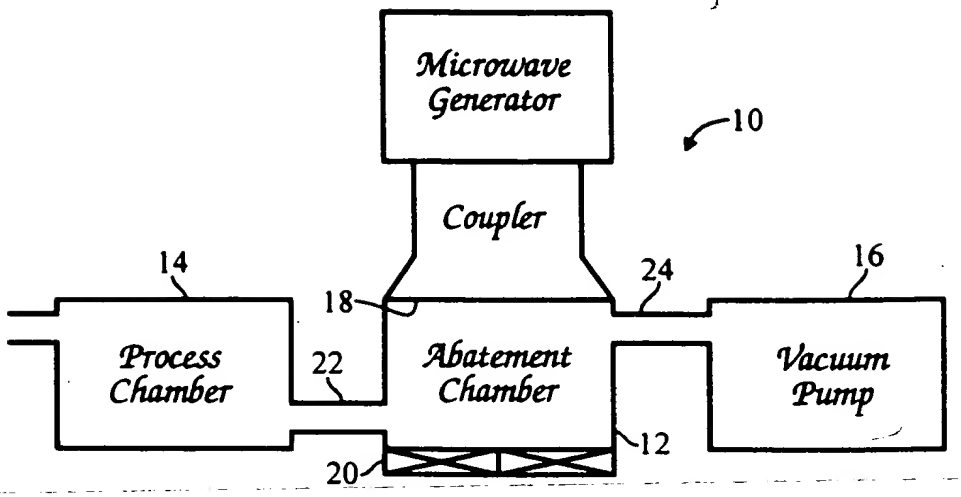

Fig. 1 (Prior Art)

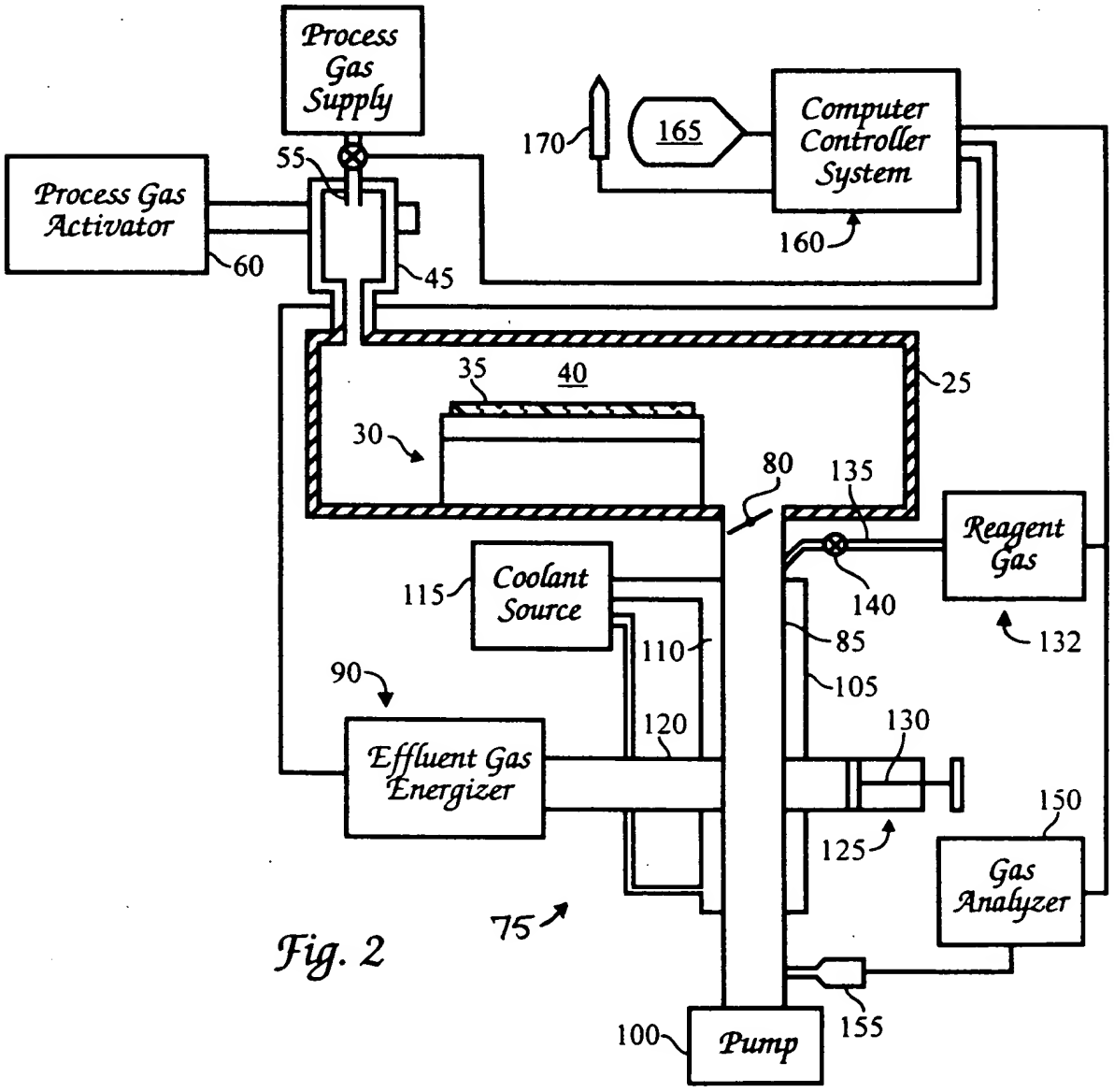

Fig. 2